Table C.8-21. Terminal, light crude (ES-Pipe-12k-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	12	0.7	0.0000003
Shorebirds	759	0.7	0.0000003
Cetaceans (dolphins)	1	1.3	0.0000005
Pinnipeds (seals)	1	23.2	0.00001
Total	773		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-22. Terminal, light crude (ES-Pipe-12k-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	2,254	126	0	0	412
Loons	0.99	2,254	2,432	407	2	1,449
Grebes	0.35	797	241	68	0	198
Small alcids	0.35	797	812	306	34	45
Cormorants	0.35	797	2,029	58	69	475
Gulls	0.05	114	881	875	1,012	3,193
Jaegers	0.05	114	7	5	42	7
Kittiwakes	0.05	114	145	8	0	7
Murres	0.35	797	805	219	2	190
Phalaropes	0.99	2,254	893	7,032	2,974	1,311
Shearwaters and fulmars	0.05	114	16	4,168	311	8
Storm-petrels	0.35	797	242	7	334	32
Terns	0.05	114	3	1	102	0
Pelicans	0.05	114	19	23	71	59
Total waterfowl and seabirds			8,652	13,176	4,951	7,387

Table C.8-23. Terminal, light crude (ES-Pipe-12k-lc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	1.00	48
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.00	0
10	0.00	0
All	1.00	48

Table C.8-24. Terminal, light crude (ES-Pipe-12k-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	2	1.0	0.0000004
Shorebirds	468	1.0	0.0000004
Cetaceans (dolphins)	0	0.0	0.0
Pinnipeds (seals)	0.1	0.5	0.0000002
Total	469		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-25. Terminal, light crude (ES-Pipe-12k-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in summer.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	47	1	0	0	8
Loons	0.99	47	86	2	0	123
Grebes	0.35	17	25	10	0	0
Small alcids	0.35	17	7	0	0	0
Cormorants	0.35	17	5	1	0	0
Gulls	0.05	2	46	13	16	365
Jaegers	0.05	2	0	0	0	0
Kittiwakes	0.05	2	1	0	0	0
Murres	0.35	17	4	0	0	1
Phalaropes	0.99	47	14	89	183	10
Shearwaters and fulmars	0.05	2	0	10	2	0
Storm-petrels	0.35	17	0	0	9	4
Terns	0.05	2	0	0	0	0
Pelicans	0.05	2	0	1	1	2
Total waterfowl and seabirds			189	128	211	513

Table C.8-26. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.10	257
2	0.09	243
3	0.00	0
4	0.00	0
5	0.00	0
6	0.14	361
7	0.05	126
8	0.46	1,199
9	0.17	443
10	0.00	0
All	1.00	2,630

Table C.8-27. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	18	0.5	0.0000002
Shorebirds	427	0.5	0.0000002
Cetaceans (dolphins)	1	1.6	0.000001
Pinnipeds (seals)	5	26.9	0.00001
Total	451		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-28. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	2,604	91	-	-	409
Loons	0.99	2,604	8,921	950	11	2,431
Grebes	0.35	921	489	72	-	880
Small alcids	0.35	921	1,504	314	51	104
Cormorants	0.35	921	1,177	55	61	453
Gulls	0.05	132	977	641	1,509	3,376
Jaegers	0.05	132	9	6	44	20
Kittiwakes	0.05	132	158	9	3	10
Murres	0.35	921	2,155	786	9	735
Phalaropes	0.99	2,604	692	6,338	3,811	1,214
Shearwaters and fulmars	0.05	132	22	4,099	591	15
Storm-petrels	0.35	921	157	11	336	27
Terns	0.05	132	2	1	93	0
Pelicans	0.05	132	27	41	83	133
Total waterfowl and seabirds			16,382	13,322	6,599	9,808

Table C.8-29. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.10	249
2	0.23	605
3	0.01	22
4	0.00	5
5	0.00	0
6	0.01	25
7	0.03	67
8	0.62	1,619
9	0.00	3
10	0.00	0
All	1.00	2,595

Table C.8-30. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	11	0.7	0.0000003
Shorebirds	712	0.7	0.0000003
Cetaceans (dolphins)	2	1.5	0.000001
Pinnipeds (seals)	1	26.5	0.00001
Total	726		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-31. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	2,569	220	0	0	496
Loons	0.99	2,569	1,508	390	1	1,225
Grebes	0.35	908	174	52	0	113
Small acids	0.35	908	1,012	403	40	58
Cormorants	0.35	908	2,625	68	92	610
Gulls	0.05	130	903	1,070	1,050	2,729
Jaegers	0.05	130	9	5	48	6
Kittiwakes	0.05	130	175	9	0	7
Murres	0.35	908	726	155	1	126
Phalaropes	0.99	2,569	1,175	8,244	2,850	1,602
Shearwaters and fulmars	0.05	130	18	4,905	324	9
Storm-petrels	0.35	908	315	9	372	28
Terns	0.05	130	2	2	120	0
Pelicans	0.05	130	22	20	80	52
Total waterfowl and seabirds			8,884	15,332	4,978	7,061

Table C.8-32. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	1.00	15
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.00	0
10	0.00	0
All	1.00	15

Table C.8-33. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	27	0.8	0.0000003
Shorebirds	654	0.8	0.0000003
Cetaceans (dolphins)	0	0.0	0.0
Pinnipeds (seals)	0.03	0.2	0.0000001
Total	681		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-34. Terminal, heavy crude (ES-Pipe-12k-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	15	0	0	0	2
Loons	0.99	15	27	1	0	39
Grebes	0.35	5	8	3	0	0
Small alcids	0.35	5	2	0	0	0
Cormorants	0.35	5	1	0	0	0
Gulls	0.05	1	14	4	5	115
Jaegers	0.05	1	0	0	0	0
Kittiwakes	0.05	1	0	0	0	0
Murres	0.35	5	1	0	0	0
Phalaropes	0.99	15	4	28	58	3
Shearwaters and fulmars	0.05	1	0	3	0	0
Storm-petrels	0.35	5	0	0	3	1
Terns	0.05	1	0	0	0	0
Pelicans	0.05	1	0	0	0	1
Total waterfowl and seabirds			60	40	66	161

Table C.8-35. Transit, diesel (ES-Trans-d), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.60	7,265
7	0.25	2,983
8	0.16	1,923
9	0.00	0
10	0.00	0
All	1.00	12,171

Table C.8-36. Transit, diesel (ES-Trans-d), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	237	7.2	0.000003
Shorebirds	5,718	7.2	0.000003
Cetaceans (dolphins)	2	3.8	0.000001
Pinnipeds (seals)	25	131.8	0.00005
Total	5,982		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-37. Transit, diesel (ES-Trans-d), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	12,049	314	0	0	2,566
Loons	0.99	12,049	165,238	14,583	83	29,135
Grebes	0.35	4,260	6,921	406	0	17,224
Small alcids	0.35	4,260	4,169	1,375	447	916
Cormorants	0.35	4,260	1,342	399	85	826
Gulls	0.05	609	6,084	2,875	16,271	18,212
Jaegers	0.05	609	54	29	233	138
Kittiwakes	0.05	609	540	61	51	103
Murres	0.35	4,260	36,190	14,410	172	13,795
Phalaropes	0.99	12,049	251	18,058	31,645	3,841
Shearwaters and fulmars	0.05	609	179	8,825	7,783	189
Storm-petrels	0.35	4,260	0	10	890	10
Terns	0.05	609	0	2	226	8
Pelicans	0.05	609	261	515	677	1,974
Total waterfowl and seabirds			221,544	61,549	58,563	88,938

Table C.8-38. Transit, diesel (ES-Trans-d), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.14	1,557
3	0.24	2,573
4	0.04	401
5	0.00	0
6	0.00	2
7	0.04	420
8	0.11	1,236
9	0.43	4,576
10	0.00	1
All	1.00	10,767

Table C.8-39. Transit, diesel (ES-Trans-d), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	96	5.9	0.000002
Shorebirds	6,135	5.9	0.000002
Cetaceans (dolphins)	4	3.4	0.000001
Pinnipeds (seals)	4	121.6	0.00005
Total	6,239		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-40. Transit, diesel (ES-Trans-d), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	10,660	7,582	0	0	3,185
Loons	0.99	10,660	3,726	1,388	62	3,450
Grebes	0.35	3,769	334	5	0	188
Small alcids	0.35	3,769	14,964	3,505	312	1,287
Cormorants	0.35	3,769	8,366	216	1,489	3,492
Gulls	0.05	538	1,742	2,823	1,090	1,735
Jaegers	0.05	538	39	8	64	121
Kittiwakes	0.05	538	1,095	22	0	31
Murres	0.35	3,769	3,059	166	0	220
Phalaropes	0.99	10,660	12,711	20,161	3,515	7,016
Shearwaters and fulmars	0.05	538	81	10,085	1,283	77
Storm-petrels	0.35	3,769	1,131	62	752	56
Terns	0.05	538	0	7	155	1
Pelicans	0.05	538	53	16	145	136
Total waterfowl and seabirds			54,882	38,464	8,867	20,994

Table C.8-41. Transit, diesel (ES-Trans-d), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.82	7,286
2	0.00	0
3	0.00	0
4	0.00	0
5	0.10	880
6	0.00	0
7	0.00	0
8	0.08	676
9	0.00	0
10	0.00	0
All	1.00	8,842

Table C.8-42. Transit, diesel (ES-Trans-d), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	241	14.7	0.00001
Shorebirds	15,403	14.7	0.00001
Cetaceans (dolphins)	1	0.5	0.0000002
Pinnipeds (seals)	5	126.6	0.00005
Total	15,649		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-43. Transit, diesel (ES-Trans-d), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	8,754	107	0	0	1,258
Loons	0.99	8,754	13,260	839	3	22,577
Grebes	0.35	3,095	3,813	1,470	0	19
Small alcids	0.35	3,095	1,536	106	61	30
Cormorants	0.35	3,095	854	221	301	323
Gulls	0.05	442	7,455	2,120	2,846	56,221
Jaegers	0.05	442	7	62	55	41
Kittiwakes	0.05	442	283	35	0	35
Murres	0.35	3,095	799	133	0	116
Phalaropes	0.99	8,754	2,307	17,896	32,842	4,643
Shearwaters and fulmars	0.05	442	54	3,495	313	71
Storm-petrels	0.35	3,095	0	4	2,871	563
Terns	0.05	442	71	10	118	0
Pelicans	0.05	442	38	183	132	431
Total waterfowl and seabirds			30,583	26,574	39,541	86,328

Table C.8-44. Transit, light crude (ES-Trans-lc), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.60	2,540
7	0.23	980
8	0.17	730
9	0.00	0
10	0.00	0
All	1.00	4,250

Table C.8-45. Transit, light crude (ES-Trans-lc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	159	4.9	0.000002
Shorebirds	3,853	4.9	0.000002
Cetaceans (dolphins)	1	1.7	0.000001
Pinnipeds (seals)	8	44.5	0.00002
Total	4,022		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-46. Transit, light crude (ES-Trans-lc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	4,207	106	0	0	883
Loons	0.99	4,207	57,745	5,088	29	10,184
Grebes	0.35	1,487	2,420	141	0	6,021
Small alcids	0.35	1,487	1,424	458	157	319
Cormorants	0.35	1,487	464	136	32	283
Gulls	0.05	212	2,136	997	5,714	6,368
Jaegers	0.05	212	19	10	82	48
Kittiwakes	0.05	212	192	21	18	35
Murres	0.35	1,487	12,638	5,038	60	4,823
Phalaropes	0.99	4,207	92	6,486	11,112	1,359
Shearwaters and fulmars	0.05	212	63	3,206	2,723	65
Storm-petrels	0.35	1,487	0	4	319	4
Terns	0.05	212	0	1	82	3
Pelicans	0.05	212	91	181	237	688
Total waterfowl and seabirds			77,390	21,765	20,564	31,083

Table C.8-47. Transit, light crude (ES-Trans-lc), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	33
2	0.24	2,789
3	0.06	682
4	0.00	26
5	0.00	0
6	0.00	2
7	0.21	2,498
8	0.36	4,178
9	0.13	1,527
10	0.00	2
All	1.00	11,737

Table C.8-48. Transit, light crude (ES-Trans-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	9	0.6	0.0000002
Shorebirds	593	0.6	0.0000002
Cetaceans (dolphins)	7	6.7	0.000003
Pinnipeds (seals)	5	131.4	0.00005
Total	614		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-49. Transit, light crude (ES-Trans-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	11,619	2,731	0	0	2,966
Loons	0.99	11,619	3,851	1,875	26	2,901
Grebes	0.35	4,108	156	37	0	299
Small alcids	0.35	4,108	9,056	3,159	188	555
Cormorants	0.35	4,108	12,467	404	605	3,580
Gulls	0.05	587	2,531	4,923	2,733	3,535
Jaegers	0.05	587	42	11	161	58
Kittiwakes	0.05	587	825	46	0	71
Murres	0.35	4,108	3,487	446	0	342
Phalaropes	0.99	11,619	7,298	27,843	5,918	7,159
Shearwaters and fulmars	0.05	587	67	16,127	1,343	83
Storm-petrels	0.35	4,108	1,559	40	1,135	33
Terns	0.05	587	0	9	380	7
Pelicans	0.05	587	92	38	311	248
Total waterfowl and seabirds			44,162	54,958	12,801	21,835

Table C.8-50. Transit, light crude (ES-Trans-lc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	1.00	2,303
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	2
9	0.00	0
10	0.00	0
All	1.00	2,306

Table C.8-51 Transit, light crude (ES-Trans-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	28	1.7	0.000001
Shorebirds	1,816	1.7	0.000001
Cetaceans (dolphins)	0	0.0	0.0
Pinnipeds (seals)	1	24.1	0.00001
Total	1,845		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-52. Transit, light crude (ES-Trans-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	2,282	29	0	0	370
Loons	0.99	2,282	4,111	111	1	5,889
Grebes	0.35	807	1,194	465	0	2
Small alcids	0.35	807	354	17	7	0
Cormorants	0.35	807	219	61	24	8
Gulls	0.05	115	2,204	627	753	17,523
Jaegers	0.05	115	1	19	11	12
Kittiwakes	0.05	115	64	10	0	10
Murres	0.35	807	215	21	0	28
Phalaropes	0.99	2,282	676	4,293	8,802	493
Shearwaters and fulmars	0.05	115	10	485	73	4
Storm-petrels	0.35	807	0	0	412	177
Terns	0.05	115	20	0	17	0
Pelicans	0.05	115	9	55	28	118
Total waterfowl and seabirds			9,106	6,165	10,127	24,634

Table C.8-53. Transit, heavy crude (ES-Trans-hc), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.80	1,790
7	0.00	0
8	0.20	448
9	0.00	0
10	0.00	0
All	1.00	2,238

Table C.8-54. Transit, heavy crude (ES-Trans-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	9	5.1	0.000002
Shorebirds	2,493	5.1	0.000002
Cetaceans (dolphins)	0	0.2	0.0000001
Pinnipeds (seals)	3	23.0	0.00001
Total	2,505		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-55. Transit, heavy crude (ES-Trans-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in summer.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	2,216	16	0	0	377
Loons	0.99	2,216	40,283	3,369	20	7,023
Grebes	0.35	783	1,703	91	0	4,226
Small alcids	0.35	783	466	40	104	212
Cormorants	0.35	783	241	46	18	97
Gulls	0.05	112	1,382	575	3,936	4,216
Jaegers	0.05	112	11	6	46	32
Kittiwakes	0.05	112	118	8	13	11
Murres	0.35	783	8,614	3,502	42	3,367
Phalaropes	0.99	2,216	60	4,047	7,658	861
Shearwaters and fulmars	0.05	112	44	1,550	1,854	34
Storm-petrels	0.35	783	0	2	195	2
Terns	0.05	112	0	0	36	0
Pelicans	0.05	112	58	126	147	449
Total waterfowl and seabirds			52,995	13,364	14,070	20,906

Table C.8-56. Transit, heavy crude (ES-Trans-hc), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.13	1,008
3	0.25	1,993
4	0.03	241
5	0.00	0
6	0.00	3
7	0.00	0
8	0.13	1,049
9	0.45	3,536
10	0.00	0
All	1.00	7,830

Table C.8-57. Transit, heavy crude (ES-Trans-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	116	7.1	0.000003
Shorebirds	7,406	7.1	0.000003
Cetaceans (dolphins)	4	3.5	0.000001
Pinnipeds (seals)	3	85.4	0.00003
Total	7,529		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-58. Transit, heavy crude (ES-Trans-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	7,752	5,812	0	0	2,302
Loons	0.99	7,752	2,660	919	48	2,563
Grebes	0.35	2,741	260	0	0	127
Small acids	0.35	2,741	11,095	2,421	212	964
Cormorants	0.35	2,741	5,566	130	1,152	2,490
Gulls	0.05	392	1,262	1,836	852	1,229
Jaegers	0.05	392	28	6	47	92
Kittiwakes	0.05	392	828	14	0	17
Murres	0.35	2,741	2,158	111	0	158
Phalaropes	0.99	7,752	9,551	15,009	2,646	5,128
Shearwaters and fulmars	0.05	392	60	7,785	916	53
Storm-petrels	0.35	2,741	772	48	573	39
Terns	0.05	392	0	5	116	0
Pelicans	0.05	392	36	12	99	86
Total waterfowl and seabirds			40,088	28,297	6,660	15,246

Table C.8-59. Transit, heavy crude (ES-Trans-hc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.02	231
2	0.05	463
3	0.22	2,162
4	0.07	718
5	0.00	0
6	0.00	0
7	0.19	1,911
8	0.19	1,912
9	0.26	2,572
10	0.00	1
All	1.00	9,970

Table C.8-60. Transit, heavy crude (ES-Trans-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	38	2.3	0.000001
Shorebirds	2,450	2.3	0.000001
Cetaceans (dolphins)	7	6.4	0.000002
Pinnipeds (seals)	4	108.5	0.00004
Total	2,499		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-61. Transit, heavy crude (ES-Trans-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	9,870	6,362	0	0	3,017
Loons	0.99	9,870	4,101	1,873	38	3,528
Grebes	0.35	3,489	412	70	0	125
Small alcids	0.35	3,489	11,509	3,369	366	1,050
Cormorants	0.35	3,489	4,007	287	1,266	2,057
Gulls	0.05	498	2,074	1,466	1,493	3,860
Jaegers	0.05	498	33	11	98	83
Kittiwakes	0.05	498	856	35	0	54
Murres	0.35	3,489	2,960	275	0	284
Phalaropes	0.99	9,870	9,163	17,981	4,769	4,814
Shearwaters and fulmars	0.05	498	71	11,271	1,244	86
Storm-petrels	0.35	3,489	421	44	704	96
Terns	0.05	498	2	4	222	5
Pelicans	0.05	498	48	26	153	190
Total waterfowl and seabirds			42,019	36,712	10,352	19,248

Table C.8-62. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.60	96
7	0.25	39
8	0.16	25
9	0.00	0
10	0.00	0
All	1.00	160

Table C.8-63. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	45	1.4	0.000001
Shorebirds	1,085	1.4	0.000001
Cetaceans (dolphins)	0	0.1	0.00000005
Pinnipeds (seals)	0	1.6	0.000001
Total	1,130		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-64. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	158	4	0	0	34
Loons	0.99	158	2,173	192	1	383
Grebes	0.35	56	91	5	0	226
Small alcids	0.35	56	55	18	6	12
Cormorants	0.35	56	18	5	1	11
Gulls	0.05	8	80	38	214	239
Jaegers	0.05	8	1	0	3	2
Kittiwakes	0.05	8	7	1	1	1
Murres	0.35	56	476	189	2	181
Phalaropes	0.99	158	3	237	416	51
Shearwaters and fulmars	0.05	8	2	116	102	2
Storm-petrels	0.35	56	0	0	12	0
Terns	0.05	8	0	0	3	0
Pelicans	0.05	8	3	7	9	26
Total waterfowl and seabirds			2,913	809	770	1,169

Table C.8-65. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.14	235
3	0.24	388
4	0.04	61
5	0.00	0
6	0.00	0
7	0.04	63
8	0.11	186
9	0.43	690
10	0.00	0
All	1.00	1,624

Table C.8-66. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	6	0.4	0.0000001
Shorebirds	367	0.4	0.0000001
Cetaceans (dolphins)	1	0.7	0.0000003
Pinnipeds (seals)	1	16.5	0.00001
Total	374		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-67. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	1,608	1,144	0	0	480
Loons	0.99	1,608	562	209	9	520
Grebes	0.35	568	50	1	0	28
Small alcids	0.35	568	2,257	529	47	194
Cormorants	0.35	568	1,262	33	225	527
Gulls	0.05	81	263	426	164	262
Jaegers	0.05	81	6	1	10	18
Kittiwakes	0.05	81	165	3	0	5
Murres	0.35	568	461	25	0	33
Phalaropes	0.99	1,608	1,917	3,041	530	1,058
Shearwaters and fulmars	0.05	81	12	1,521	194	12
Storm-petrels	0.35	568	171	9	113	9
Terns	0.05	81	0	1	23	0
Pelicans	0.05	81	8	2	22	21
Total waterfowl and seabirds			8,278	5,802	1,337	3,167

Table C.8-68. Transit, 2,500 bbl diesel (ES-Trans-2k-d worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.82	577
2	0.00	0
3	0.00	0
4	0.00	0
5	0.10	70
6	0.00	0
7	0.00	0
8	0.08	54
9	0.00	0
10	0.00	0
All	1.00	701

Table C.8-69. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	9	0.6	0.0000002
Shorebirds	606	0.6	0.0000002
Cetaceans (dolphins)	0	0.0	0.00
Pinnipeds (seals)	0	7.2	0.000003
Total	615		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-70. Transit, 2,500 bbl diesel (ES-Trans-2k-d), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	694	8	0	0	100
Loons	0.99	694	1,051	67	0	1,789
Grebes	0.35	245	302	117	0	2
Small alcids	0.35	245	122	8	5	2
Cormorants	0.35	245	68	18	24	26
Gulls	0.05	35	591	168	226	4,456
Jaegers	0.05	35	1	5	4	3
Kittiwakes	0.05	35	22	3	0	3
Murres	0.35	245	63	11	0	9
Phalaropes	0.99	694	183	1,418	2,603	368
Shearwaters and fulmars	0.05	35	4	277	25	6
Storm-petrels	0.35	245	0	0	228	45
Terns	0.05	35	6	1	9	0
Pelicans	0.05	35	3	14	10	34
Total waterfowl and seabirds			2,424	2,106	3,134	6,842

Table C.8-71. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.60	102
7	0.23	39
8	0.17	29
9	0.00	0
10	0.00	0
All	1.00	170

Table C.8-72. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	56	1.7	0.000001
Shorebirds	1,364	1.7	0.000001
Cetaceans (dolphins)	0	0.1	0.0000001
Pinnipeds (seals)	0	1.8	0.000001
Total	1,421		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-73. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	168	4	0	0	35
Loons	0.99	168	2,308	203	1	407
Grebes	0.35	59	97	6	0	241
Small alcids	0.35	59	57	18	6	13
Cormorants	0.35	59	19	5	1	11
Gulls	0.05	8	85	40	228	255
Jaegers	0.05	8	1	0	3	2
Kittiwakes	0.05	8	8	1	1	1
Murres	0.35	59	505	201	2	193
Phalaropes	0.99	168	4	259	444	54
Shearwaters and fulmars	0.05	8	3	128	109	3
Storm-petrels	0.35	59	0	0	13	0
Terns	0.05	8	0	0	3	0
Pelicans	0.05	8	4	7	9	27
Total waterfowl and seabirds			3,094	870	822	1,242

Table C.8-74. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	5
2	0.24	422
3	0.06	103
4	0.00	4
5	0.00	0
6	0.00	0
7	0.21	378
8	0.36	632
9	0.13	231
10	0.00	0
All	1.00	1,775

Table C.8-75. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	0	0.02	0.00000001
Shorebirds	24	0.02	0.00000001
Cetaceans (dolphins)	1	1.3	0.0000005
Pinnipeds (seals)	1	18.0	0.00001
Total	27		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-76. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	1,757	413	0	0	449
Loons	0.99	1,757	582	284	4	439
Grebes	0.35	621	24	6	0	45
Small alcids	0.35	621	1,370	478	28	84
Cormorants	0.35	621	1,885	61	92	541
Gulls	0.05	89	383	744	413	535
Jaegers	0.05	89	6	2	24	9
Kittiwakes	0.05	89	125	7	0	11
Murres	0.35	621	527	67	0	52
Phalaropes	0.99	1,757	1,104	4,211	895	1,083
Shearwaters and fulmars	0.05	89	10	2,439	203	13
Storm-petrels	0.35	621	236	6	172	5
Terns	0.05	89	0	1	58	1
Pelicans	0.05	89	14	6	47	37
Total waterfowl and seabirds			6,679	8,311	1,936	3,302

Table C.8-77. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	1.00	17
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.00	0
10	0.00	0
All	1.00	17

Table C.8-78. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	7	0.4	0.0000002
Shorebirds	431	0.4	0.0000002
Cetaceans (dolphins)	0	0.0	0.0
Pinnipeds (seals)	0	0.2	0.0000001
Total	438		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-79. Transit, 2,500 bbl light crude (ES-Trans-2k-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	17	0	0	0	3
Loons	0.99	17	31	1	0	45
Grebes	0.35	6	9	4	0	0
Small alcids	0.35	6	3	0	0	0
Cormorants	0.35	6	2	0	0	0
Gulls	0.05	1	17	5	6	133
Jaegers	0.05	1	0	0	0	0
Kittiwakes	0.05	1	0	0	0	0
Murres	0.35	6	2	0	0	0
Phalaropes	0.99	17	5	32	67	4
Shearwaters and fulmars	0.05	1	0	4	1	0
Storm-petrels	0.35	6	0	0	3	1
Terns	0.05	1	0	0	0	0
Pelicans	0.05	1	0	0	0	1
Total waterfowl and seabirds			69	47	77	186

Table C.8-80. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.80	444
7	0.00	0
8	0.20	111
9	0.00	0
10	0.00	0
All	1.00	555

Table C.8-81. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	1	0.7	0.0000003
Shorebirds	345	0.7	0.0000003
Cetaceans (dolphins)	0	0.1	0.00000004
Pinnipeds (seals)	1	5.6	0.000002
Total	347		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-82. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in summer.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	549	4	0	0	93
Loons	0.99	549	9,983	835	5	1,740
Grebes	0.35	194	422	23	0	1,047
Small alcids	0.35	194	116	10	26	53
Cormorants	0.35	194	60	11	5	24
Gulls	0.05	28	342	142	975	1,045
Jaegers	0.05	28	3	2	11	8
Kittiwakes	0.05	28	29	2	3	3
Murres	0.35	194	2,135	868	10	834
Phalaropes	0.99	549	15	1,003	1,898	213
Shearwaters and fulmars	0.05	28	11	384	460	8
Storm-petrels	0.35	194	0	1	48	1
Terns	0.05	28	0	0	9	0
Pelicans	0.05	28	14	31	37	111
Total waterfowl and seabirds			13,133	3,312	3,487	5,181

Table C.8-83. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.00	0
2	0.13	132
3	0.25	262
4	0.03	32
5	0.00	0
6	0.00	0
7	0.00	0
8	0.13	138
9	0.45	465
10	0.00	0
All	1.00	1,029

Table C.8-84. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	5	0.3	0.0000001
Shorebirds	323	0.3	0.0000001
Cetaceans (dolphins)	1	0.6	0.0000002
Pinnipeds (seals)	0.4	10.4	0.000004
Total	329		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-85. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	1,019	764	0	0	303
Loons	0.99	1,019	350	121	6	337
Grebes	0.35	360	34	0	0	17
Small acids	0.35	360	1,459	318	28	127
Cormorants	0.35	360	732	17	151	327
Gulls	0.05	51	166	241	112	162
Jaegers	0.05	51	4	1	6	12
Kittiwakes	0.05	51	109	2	0	2
Murres	0.35	360	284	15	0	21
Phalaropes	0.99	1,019	1,256	1,973	348	674
Shearwaters and fulmars	0.05	51	8	1,024	120	7
Storm-petrels	0.35	360	101	6	75	5
Terns	0.05	51	0	1	15	0
Pelicans	0.05	51	5	2	13	11
Total waterfowl and seabirds			5,270	3,720	876	2,004

Table C.8-86. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.02	34
2	0.05	67
3	0.22	315
4	0.07	105
5	0.00	0
6	0.00	0
7	0.19	278
8	0.19	278
9	0.26	374
10	0.00	0
All	1.00	1,452

Table C.8-87. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	1	0.04	0.00000002
Shorebirds	45	0.04	0.00000002
Cetaceans (dolphins)	1	1.3	0.0000005
Pinnipeds (seals)	1	14.7	0.00001
Total	47		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-88. Transit, 2,500 bbl heavy crude (ES-Trans-2k-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	1,437	926	0	0	439
Loons	0.99	1,437	901	272	6	1,561
Grebes	0.35	508	60	10	0	18
Small alcids	0.35	508	1,676	491	53	153
Cormorants	0.35	508	583	42	184	300
Gulls	0.05	73	302	213	217	562
Jaegers	0.05	73	5	2	14	12
Kittiwakes	0.05	73	125	5	0	8
Murres	0.35	508	431	40	0	41
Phalaropes	0.99	1,437	1,334	2,618	694	701
Shearwaters and fulmars	0.05	73	10	1,641	181	13
Storm-petrels	0.35	508	61	6	102	14
Terns	0.05	73	0	1	32	1
Pelicans	0.05	73	7	4	22	28
Total waterfowl and seabirds			6,422	5,345	1,507	3,850

Table C.8-89. Alternate Berth, diesel (ES-Alt-30K-d), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.03	95
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.61	2,273
7	0.17	636
8	0.19	704
9	0.00	0
10	0.00	0
All	1.00	3,709

Table C.8-90. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	38	1.2	0.0000004
Shorebirds	916	1.2	0.0000004
Cetaceans (dolphins)	1	1.5	0.000001
Pinnipeds (seals)	7	38.4	0.00001
Total	962		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-91. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	3,672	78	0	0	730
Loons	0.99	3,672	51,715	4,494	26	9,316
Grebes	0.35	1,298	2,215	143	0	5,383
Small alcids	0.35	1,298	1,120	316	139	282
Cormorants	0.35	1,298	398	108	31	221
Gulls	0.05	185	1,983	877	5,153	6,357
Jaegers	0.05	185	16	10	72	43
Kittiwakes	0.05	185	173	17	16	27
Murres	0.35	1,298	11,230	4,497	54	4,309
Phalaropes	0.99	3,672	115	6,056	10,321	1,232
Shearwaters and fulmars	0.05	185	57	2,858	2,426	55
Storm-petrels	0.35	1,298	0	4	305	11
Terns	0.05	185	1	1	71	2
Pelicans	0.05	185	80	164	209	609
Total waterfowl and seabirds			69,181	19,543	18,822	28,577

Table C.8-92. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.01	45
2	0.25	779
3	0.08	236
4	0.00	3
5	0.00	0
6	0.00	0
7	0.12	372
8	0.39	1,192
9	0.14	436
10	0.00	0
All	1.00	3,062

Table C.8-93. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	2	0.1	0.00000005
Shorebirds	133	0.1	0.00000005
Cetaceans (dolphins)	2	2.3	0.000001
Pinnipeds (seals)	1	31.4	0.00001
Total	139		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-94. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	3,032	864	-	-	763
Loons	0.99	3,032	984	433	7	874
Grebes	0.35	1,072	67	14	-	75
Small alcids	0.35	1,072	2,379	771	50	161
Cormorants	0.35	1,072	3,463	91	194	965
Gulls	0.05	153	707	1,330	763	1,162
Jaegers	0.05	153	11	3	41	16
Kittiwakes	0.05	153	237	10	-	14
Murres	0.35	1,072	872	104	-	84
Phalaropes	0.99	3,032	2,206	7,901	1,768	2,025
Shearwaters and fulmars	0.05	153	19	4,381	357	18
Storm-petrels	0.35	1,072	436	12	320	12
Terns	0.05	153	0	2	101	1
Pelicans	0.05	153	23	11	80	55
Total waterfowl and seabirds			12,269	15,064	3,680	6,225

Table C.8-95. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.99	536
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.01	5
9	0.00	0
10	0.00	0
All	1.00	541

Table C.8-96. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	27	1.6	0.000001
Shorebirds	1,698	1.6	0.000001
Cetaceans (dolphins)	0	0.01	0.00000001
Pinnipeds (seals)	0	5.5	0.000002
Total	1,725		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-97. Alternate Berth, diesel (ES-Alt-30k-d), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	535	7	0	0	87
Loons	0.99	535	957	27	0	1,371
Grebes	0.35	189	278	108	0	1
Small alcids	0.35	189	83	4	2	0
Cormorants	0.35	189	51	14	6	2
Gulls	0.05	27	514	146	177	4,078
Jaegers	0.05	27	0	4	3	3
Kittiwakes	0.05	27	15	2	0	2
Murres	0.35	189	51	5	0	7
Phalaropes	0.99	535	158	1,013	2,052	116
Shearwaters and fulmars	0.05	27	2	125	17	1
Storm-petrels	0.35	189	0	0	96	41
Terns	0.05	27	5	0	4	0
Pelicans	0.05	27	2	13	7	27
Total waterfowl and seabirds			2,123	1,463	2,364	5,736

Table C.8-98. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.02	71
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.60	1,733
7	0.18	512
8	0.20	583
9	0.00	0
10	0.00	0
All	1.00	2,899

Table C.8-99. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	58	1.8	0.000001
Shorebirds	1,395	1.8	0.000001
Cetaceans (dolphins)	1	1.1	0.0000004
Pinnipeds (seals)	6	29.8	0.00001
Total	1,459		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-100. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	2,870	62	0	0	571
Loons	0.99	2,870	39,443	3,440	20	7,113
Grebes	0.35	1,015	1,689	109	0	4,104
Small alcids	0.35	1,015	884	254	107	216
Cormorants	0.35	1,015	309	85	26	175
Gulls	0.05	145	1,529	675	3,955	4,867
Jaegers	0.05	145	13	8	56	33
Kittiwakes	0.05	145	135	13	12	21
Murres	0.35	1,015	8,580	3,432	41	3,288
Phalaropes	0.99	2,870	91	4,788	7,914	960
Shearwaters and fulmars	0.05	145	44	2,335	1,856	42
Storm-petrels	0.35	1,015	0	3	241	9
Terns	0.05	145	1	0	58	1
Pelicans	0.05	145	62	125	161	466
Total waterfowl and seabirds			52,842	15,268	14,448	21,866

Table C.8-101. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.02	68
2	0.25	820
3	0.06	191
4	0.00	7
5	0.00	0
6	0.00	0
7	0.02	74
8	0.53	1,774
9	0.12	404
10	0.00	0
All	1.00	3,339

Table C.8-102. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	2	0.1	0.0000001
Shorebirds	155	0.1	0.0000001
Cetaceans (dolphins)	2	1.9	0.000001
Pinnipeds (seals)	1	34.3	0.00001
Total	161		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-103. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	3,305	736	0	0	717
Loons	0.99	3,305	902	431	6	945
Grebes	0.35	1,169	78	15	0	73
Small alcids	0.35	1,169	2,206	674	56	148
Cormorants	0.35	1,169	3,610	81	194	968
Gulls	0.05	167	868	1,369	1,058	1,457
Jaegers	0.05	167	12	4	53	15
Kittiwakes	0.05	167	262	10	0	9
Murres	0.35	1,169	846	119	0	93
Phalaropes	0.99	3,305	2,161	9,853	2,387	2,238
Shearwaters and fulmars	0.05	167	23	5,811	399	14
Storm-petrels	0.35	1,169	455	14	416	17
Terns	0.05	167	1	3	134	0
Pelicans	0.05	167	26	16	92	48
Total waterfowl and seabirds			12,186	18,399	4,796	6,744

Table C.8-104. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	1.00	88
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.00	0
10	0.00	0
All	1.00	88

Table C.8-105. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	24	1.5	0.000001
Shorebirds	1,545	1.5	0.000001
Cetaceans (dolphins)	0	0.0	0.00000001
Pinnipeds (seals)	0	0.9	0.0000004
Total	1,569		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-106. Alternate Berth, light crude (ES-Alt-30k-lc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	87	1	0	0	14
Loons	0.99	87	158	4	0	226
Grebes	0.35	31	46	18	0	0
Small alcids	0.35	31	14	1	0	0
Cormorants	0.35	31	8	2	1	0
Gulls	0.05	4	85	24	29	672
Jaegers	0.05	4	0	1	0	0
Kittiwakes	0.05	4	2	0	0	0
Murres	0.35	31	8	1	0	1
Phalaropes	0.99	87	26	164	338	19
Shearwaters and fulmars	0.05	4	0	18	3	0
Storm-petrels	0.35	31	0	0	16	7
Terns	0.05	4	1	0	1	0
Pelicans	0.05	4	0	2	1	5
Total waterfowl and seabirds			349	236	388	945

Table C.8-107. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to California mainland: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.03	70
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.60	1,644
7	0.17	475
8	0.20	540
9	0.00	0
10	0.00	0
All	1.00	2,729

Table C.8-108. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to wading birds, shorebirds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	41	1.2	0.0000005
Shorebirds	985	1.2	0.0000005
Cetaceans (dolphins)	1	1.1	0.0000004
Pinnipeds (seals)	5	28.0	0.00001
Total	1,032		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-109. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to California mainland: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	2,702	58	0	0	537
Loons	0.99	2,702	37,424	3,260	19	6,751
Grebes	0.35	955	1,603	104	0	3,894
Small alcids	0.35	955	828	236	101	204
Cormorants	0.35	955	291	80	24	164
Gulls	0.05	136	1,448	639	3,746	4,627
Jaegers	0.05	136	12	7	53	31
Kittiwakes	0.05	136	127	13	12	20
Murres	0.35	955	8,135	3,256	39	3,119
Phalaropes	0.99	2,702	86	4,497	7,504	905
Shearwaters and fulmars	0.05	136	42	2,169	1,759	40
Storm-petrels	0.35	955	0	3	227	8
Terns	0.05	136	1	0	54	1
Pelicans	0.05	136	59	119	152	441
Total waterfowl and seabirds			50,114	14,381	13,689	20,743

Table C.8-110. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to islands along Santa Barbara Channel: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	0.04	173
2	0.11	444
3	0.00	0
4	0.00	0
5	0.00	0
6	0.22	859
7	0.08	296
8	0.38	1,489
9	0.17	654
10	0.00	0
All	1.00	3,915

Table C.8-111. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	37	1.1	0.0000004
Shorebirds	894	1.1	0.0000004
Cetaceans (dolphins)	1	2.1	0.000001
Pinnipeds (seals)	8	40.5	0.00002
Total	940		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-112. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to islands along Santa Barbara Channel: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in fall.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	3,876	150	0	0	658
Loons	0.99	3,876	20,199	1,996	19	4,324
Grebes	0.35	1,370	922	82	0	2,077
Small acids	0.35	1,370	2,336	535	92	196
Cormorants	0.35	1,370	2,111	92	78	755
Gulls	0.05	196	1,415	1,123	2,700	4,086
Jaegers	0.05	196	15	7	65	33
Kittiwakes	0.05	196	235	14	6	17
Murres	0.35	1,370	4,751	1,785	20	1,688
Phalaropes	0.99	3,876	1,067	8,777	5,912	1,895
Shearwaters and fulmars	0.05	196	37	5,315	1,185	30
Storm-petrels	0.35	1,370	277	14	441	23
Terns	0.05	196	2	2	120	1
Pelicans	0.05	196	49	76	141	271
Total waterfowl and seabirds			33,565	19,818	10,779	16,054

Table C.8-113. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to water column: Area oiled per biological province in Table C.8-4.

El Segundo Province	Fraction of total oiled area	Water Area Oiled (km^2)
1	1.00	76
2	0.00	0
3	0.00	0
4	0.00	0
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.00	0
10	0.00	0
All	1.00	76

Table C.8-114. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) to birds and marine mammals.

Species Group	Number	Equivalent Area* (m^2)	Equivalent Area* ($mile^2$)
Wading birds	25	1.5	0.000001
Shorebirds	1,590	1.5	0.000001
Cetaceans (dolphins)	0	0.0	0.0
Pinnipeds (seals)	0	0.8	0.0000003
Total	1,615		

* Area swept by oil of a thickness that would effect wildlife times the probability (<1.0) of the species being on the water surface as the oil passes. Results are total by species groups.

Table C.8-115. Alternate Berth, heavy crude (ES-Alt-30k-hc), worst case run to water column: Estimated injuries (in number of individuals and in equivalent areas of 100% kill) per season to seabirds and waterfowl. The date of this worst case scenario was in winter.

Species	Probability of Intersecting Oil	Equivalent Area 100% Oiled (km^2)	# Oiled (if in winter)	# Oiled (if in spring)	# Oiled (if in summer)	# Oiled (if in fall)
Sea ducks	0.99	76	1	0	0	12
Loons	0.99	76	136	4	0	195
Grebes	0.35	27	40	15	0	0
Small alcids	0.35	27	12	1	0	0
Cormorants	0.35	27	7	2	1	0
Gulls	0.05	4	73	21	25	581
Jaegers	0.05	4	0	1	0	0
Kittiwakes	0.05	4	2	0	0	0
Murres	0.35	27	7	1	0	1
Phalaropes	0.99	76	22	142	292	16
Shearwaters and fulmars	0.05	4	0	16	2	0
Storm-petrels	0.35	27	0	0	14	6
Terns	0.05	4	1	0	1	0
Pelicans	0.05	4	0	2	1	4
Total waterfowl and seabirds			302	204	336	817

The following tables summarize the impact results for the three representation runs of all 15 scenarios, as detailed above.

Table C.8-116. Estimated injuries (in numbers of individuals) for waterfowl, seabirds in the three representative runs for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1,000 bbl (ES-Pipe-1k-d)	-	-	-
Terminal, light crude; 1,000 bbl (ES-Pipe-1k-lc)	-	-	-
Terminal, heavy crude; 1,000 bbl (ES-Pipe-1k-hc)	-	-	-
Terminal, diesel; 11,000 bbl (ES-Pipe-11k-d)	21,554	5,757	613
Terminal, light crude; 12,090 bbl (ES-Pipe-12k-lc)	12,618	8,652	211
Terminal, heavy crude; 12,090 bbl (ES-Pipe-12k-hc)	9,808	8,884	161
Transit, diesel; 275,000 bbl (ES-trans-d)	88,938	54,882	30,583
Transit, light crude; 275,000 bbl (ES-trans-lc)	31,083	44,162	9,106
Transit, heavy crude; 275,000 bbl (ES-trans-hc)	14,070	40,088	42,019
Transit, diesel; 2,500 bbl (ES-trans-d-2K)	1,169	8,278	2,424
Transit, light crude; 2,500 bbl (ES-trans-lc-2K)	1,242	6,679	69
Transit, heavy crude; 2,500 bbl (ES-trans-hc-2K)	3,487	5,270	6,118
Alternate, diesel; 30,000 bbl (ES-alt-30k-d)	28,577	12,269	2,123
Alternate, light crude; 30,000 bbl (ES-alt-30k-lc)	21,866	12,186	349
Alternate, heavy crude; 30,000 bbl (ES-alt-30k-hc)	20,743	16,054	302

Table C.8-117. Estimated injuries (in numbers of individuals) for wading birds and shorebirds in the three representative runs for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1,000 bbl (ES-Pipe-1k-d)	101	-	-
Terminal, light crude; 1,000 bbl (ES-Pipe-1k-lc)	186	-	-
Terminal, heavy crude; 1,000 bbl (ES-Pipe-1k-hc)	84	-	-
Terminal, diesel; 11,000 bbl (ES-Pipe-11k-d)	576	1,552	1,418
Terminal, light crude; 12,090 bbl (ES-Pipe-12k-lc)	806	771	469
Terminal, heavy crude; 12,090 bbl (ES-Pipe-12k-hc)	444	723	681
Transit, diesel; 275,000 bbl (ES-trans-d)	5,955	6,231	15,644
Transit, light crude; 275,000 bbl (ES-trans-lc)	4,012	602	1,844
Transit, heavy crude; 275,000 bbl (ES-trans-hc)	2,502	7,522	2,488
Transit, diesel; 2,500 bbl (ES-trans-d-2K)	1,130	372	615
Transit, light crude; 2,500 bbl (ES-trans-lc-2K)	1,421	25	438
Transit, heavy crude; 2,500 bbl (ES-trans-hc-2K)	347	328	45
Alternate, diesel; 30,000 bbl (ES-alt-30k-d)	954	135	1,725
Alternate, light crude; 30,000 bbl (ES-alt-30k-lc)	1,453	157	1,569
Alternate, heavy crude; 30,000 bbl (ES-alt-30k-hc)	1,026	931	1,615

Table C.8-118. Estimated injuries (in numbers of individuals) for all birds, including waterfowl, seabirds, wading birds, and shorebirds, in the three representative runs for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1,000 bbl (ES-Pipe-1k-d)	101	-	-
Terminal, light crude; 1,000 bbl (ES-Pipe-1k-lc)	186	-	-
Terminal, heavy crude; 1,000 bbl (ES-Pipe-1k-hc)	84	-	-
Terminal, diesel; 11,000 bbl (ES-Pipe-11k-d)	22,130	7,309	2,031
Terminal, light crude; 12,090 bbl (ES-Pipe-12k-lc)	13,424	9,424	680
Terminal, heavy crude; 12,090 bbl (ES-Pipe-12k-hc)	10,252	9,607	842
Transit, diesel; 275,000 bbl (ES-trans-d)	94,893	61,113	46,227
Transit, light crude; 275,000 bbl (ES-trans-lc)	35,095	44,764	10,951
Transit, heavy crude; 275,000 bbl (ES-trans-hc)	16,572	47,610	44,507
Transit, diesel; 2,500 bbl (ES-trans-d-2K)	2,299	8,651	3,039
Transit, light crude; 2,500 bbl (ES-trans-lc-2K)	2,663	6,703	507
Transit, heavy crude; 2,500 bbl (ES-trans-hc-2K)	3,834	5,598	6,163
Alternate, diesel; 30,000 bbl (ES-alt-30k-d)	29,531	12,404	3,848
Alternate, light crude; 30,000 bbl (ES-alt-30k-lc)	23,319	12,343	1,918
Alternate, heavy crude; 30,000 bbl (ES-alt-30k-hc)	21,770	16,984	1,917

Table C.8-119. Estimated injuries (in numbers of individuals) for marine mammals in the three representative runs for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1,000 bbl (ES-Pipe-1k-d)	2	-	-
Terminal, light crude; 1,000 bbl (ES-Pipe-1k-lc)	4	-	-
Terminal, heavy crude; 1,000 bbl (ES-Pipe-1k-hc)	3	-	-
Terminal, diesel; 11,000 bbl (ES-Pipe-11k-d)	12	1	0
Terminal, light crude; 12,090 bbl (ES-Pipe-12k-lc)	7	2	0
Terminal, heavy crude; 12,090 bbl (ES-Pipe-12k-hc)	6	3	0
Transit, diesel; 275,000 bbl (ES-trans-d)	28	8	5
Transit, light crude; 275,000 bbl (ES-trans-lc)	10	12	1
Transit, heavy crude; 275,000 bbl (ES-trans-hc)	3	7	11
Transit, diesel; 2,500 bbl (ES-trans-d-2K)	0	1	0
Transit, light crude; 2,500 bbl (ES-trans-lc-2K)	0	2	0
Transit, heavy crude; 2,500 bbl (ES-trans-hc-2K)	1	1	2
Alternate, diesel; 30,000 bbl (ES-alt-30k-d)	8	4	0
Alternate, light crude; 30,000 bbl (ES-alt-30k-lc)	6	3	0
Alternate, heavy crude; 30,000 bbl (ES-alt-30k-hc)	6	9	0

Tables C.8-120 to C.8-123 summarize the results of all the individual model runs.

Table C.8-120. Estimated impacts (in numbers of individuals oiled) to waterfowl and seabirds for the three representative runs modeled for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1000bbl (ES-Pipe-1k-d)*	0	-	-
Terminal, light crude; 1000bbl (ES-Pipe-1k-lc)*	0	-	-
Terminal, heavy crude; 1000bbl (ES-Pipe-1k-hc)*	0	-	-
Terminal, diesel; 11,000bbl (ES-Pipe-11k-d)	21,554	5,757	613
Terminal, light crude; 12,090bbl (ES-Pipe-12k-lc)	12,618	8,652	211
Terminal, heavy crude; 12,090bbl (ES-Pipe-12k-hc)	9,808	8,884	161
Transit, diesel; 275,000bbl (ES-trans-d)	88,938	54,882	30,583
Transit, light crude; 275,000bbl (ES-trans-lc)	31,083	44,162	9,106
Transit, heavy crude; 275,000bbl (ES-trans-hc)	14,070	40,088	42,019
Transit, diesel; 2,500bbl (ES-trans-d-2K)	1,169	8,278	2,424
Transit, light crude; 2,500bbl (ES-trans-lc-2K)	1,242	6,679	69
Transit, heavy crude; 2,500bbl (ES-trans-hc-2K)	3,487	5,270	6,118
Alternate, diesel; 30,000bbl (ES-alt-30k-d)	28,577	12,269	2,123
Alternate, light crude; 30,000bbl (ES-alt-30k-lc)	21,866	12,186	349
Alternate, heavy crude; 30,000bbl (ES-alt-30k-hc)	20,743	16,054	302

* Only the worst case run to the mainland was simulated for operational spills of 1000 bbl.

Table C.8-121. Estimated impacts (in numbers of individuals oiled) to wading birds and shorebirds for the three representative runs modeled for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1000bbl (ES-Pipe-1k-d)*	101	-	-
Terminal, light crude; 1000bbl (ES-Pipe-1k-lc)*	186	-	-
Terminal, heavy crude; 1000bbl (ES-Pipe-1k-hc)*	84	-	-
Terminal, diesel; 11,000bbl (ES-Pipe-11k-d)	576	1,552	1,418
Terminal, light crude; 12,090bbl (ES-Pipe-12k-lc)	806	771	469
Terminal, heavy crude; 12,090bbl (ES-Pipe-12k-hc)	444	723	681
Transit, diesel; 275,000bbl (ES-trans-d)	5,955	6,231	15,644
Transit, light crude; 275,000bbl (ES-trans-lc)	4,012	602	1,844
Transit, heavy crude; 275,000bbl (ES-trans-hc)	2,502	7,522	2,488
Transit, diesel; 2,500bbl (ES-trans-d-2K)	1,130	372	615
Transit, light crude; 2,500bbl (ES-trans-lc-2K)	1,421	25	438
Transit, heavy crude; 2,500bbl (ES-trans-hc-2K)	347	328	45
Alternate, diesel; 30,000bbl (ES-alt-30k-d)	954	135	1,725
Alternate, light crude; 30,000bbl (ES-alt-30k-lc)	1,453	157	1,569
Alternate, heavy crude; 30,000bbl (ES-alt-30k-hc)	1,026	931	1,615

* Only the worst case run to the mainland was simulated for operational spills of 1000 bbl.

Table C.8-122. Estimated impacts (in numbers of individuals oiled) to all birds, including waterfowl, seabirds, wading birds, and shorebirds, for the three representative runs modeled for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1000bbl (ES-Pipe-1k-d)*	101	-	-
Terminal, light crude; 1000bbl (ES-Pipe-1k-lc)*	186	-	-
Terminal, heavy crude; 1000bbl (ES-Pipe-1k-hc)*	84	-	-
Terminal, diesel; 11,000bbl (ES-Pipe-11k-d)	22,130	7,309	2,031
Terminal, light crude; 12,090bbl (ES-Pipe-12k-lc)	13,424	9,424	680
Terminal, heavy crude; 12,090bbl (ES-Pipe-12k-hc)	10,252	9,607	842
Transit, diesel; 275,000bbl (ES-trans-d)	94,893	61,113	46,227
Transit, light crude; 275,000bbl (ES-trans-lc)	35,095	44,764	10,951
Transit, heavy crude; 275,000bbl (ES-trans-hc)	16,572	47,610	44,507
Transit, diesel; 2,500bbl (ES-trans-d-2K)	2,299	8,651	3,039
Transit, light crude; 2,500bbl (ES-trans-lc-2K)	2,663	6,703	507
Transit, heavy crude; 2,500bbl (ES-trans-hc-2K)	3,834	5,598	6,163
Alternate, diesel; 30,000bbl (ES-alt-30k-d)	29,531	12,404	3,848
Alternate, light crude; 30,000bbl (ES-alt-30k-lc)	23,319	12,343	1,918
Alternate, heavy crude; 30,000bbl (ES-alt-30k-hc)	21,770	16,984	1,917

* Only the worst case run to the mainland was simulated for operational spills of 1000 bbl.

Table C.8-123. Estimated impacts (in numbers of individuals oiled) to marine mammals, including pinnipeds and cetaceans, for the three representative runs modeled for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1000bbl (ES-Pipe-1k-d)*	2	-	-
Terminal, light crude; 1000bbl (ES-Pipe-1k-lc)*	4	-	-
Terminal, heavy crude; 1000bbl (ES-Pipe-1k-hc)*	3	-	-
Terminal, diesel; 11,000bbl (ES-Pipe-11k-d)	12	1	0
Terminal, light crude; 12,090bbl (ES-Pipe-12k-lc)	7	2	0
Terminal, heavy crude; 12,090bbl (ES-Pipe-12k-hc)	6	3	0
Transit, diesel; 275,000bbl (ES-trans-d)	28	8	5
Transit, light crude; 275,000bbl (ES-trans-lc)	10	12	1
Transit, heavy crude; 275,000bbl (ES-trans-hc)	3	7	11
Transit, diesel; 2,500bbl (ES-trans-d-2K)	0	1	0
Transit, light crude; 2,500bbl (ES-trans-lc-2K)	0	2	0
Transit, heavy crude; 2,500bbl (ES-trans-hc-2K)	1	1	2
Alternate, diesel; 30,000bbl (ES-alt-30k-d)	8	4	0
Alternate, light crude; 30,000bbl (ES-alt-30k-lc)	6	3	0
Alternate, heavy crude; 30,000bbl (ES-alt-30k-hc)	6	9	0

* Only the worst case run to the mainland was simulated for operational spills of 1000 bbl.

Birds

Potential impacts to birds for worst case spill conditions of each scenario are summarized in Tables C.8-120 to C.8-122. In general, for those scenarios where the spill site is the terminal (either the existing or the alternative site), the worst case to the CA mainland results in the highest bird impacts of the three runs examined, because conditions are such that the oil sweeps along shore in shallow waters where seabirds are most abundant. The lighter, less viscous oils would sweep a greater water surface area (diesel sweeping the most and heavy crude the least area), and assuming spills of the large volumes examined in this

analysis, more birds would be oiled in diesel spills than for crude oils (and lighter crudes would oil more birds than heavy crudes). The worst case runs for the Channel Islands from the Terminal move across offshore waters, where fewer seabirds are present, but the oil reaches the area of the islands where seabirds are again more abundant. Spills that are the worst case for the water column generally do not sweep as much water surface with floating oil, and so have the lowest impacts of the three cases examined. Thus, the impacts of worst case spills from the Terminal for the Channel Islands are higher than those for the worst case for the water column. These types of patterns are not as clear for the in-transit spills, because the locations of the simulated releases vary among the runs examined.

The numbers of birds of all species (including waterfowl, seabirds, wading birds and shorebirds) oiled for worst-case spills from the existing terminal could reach 10s of thousands of animals. However, typical spills of the worst-case volumes examined would oil fewer birds, as would small spills. Most likely spills occurring at the Terminal would be <1,000 bbl, which would not be expected to oil seabirds and waterfowl and could oil up to one hundred shorebirds and waders (the majority of the total of those groups being sandpipers).

The hypothetical transit spills occurring offshore also are unlikely to be catastrophic and involve the entire tanker cargo. In the *Exxon Valdez* oil spill, the spilled volume (250,000 bbl) was much less than the entire tanker cargo. However, the loss of the entire cargo of a tanker in transit to or from the El Segundo Terminal (275,000 bbl) could oil 10s to 100 thousand birds, including several to as many as 16 thousand shorebirds. The estimated impact of the *Exxon Valdez* was about 350,000 birds oiled. The model estimated impacts for smaller in-transit spills of 2,500 bbl are 1-10 thousand birds, with up to about one thousand of those being shorebirds and waders (the majority of the total of those two groups being sandpipers).

Mammals

Table C.8-123 summarizes the model results for marine mammals. The majority of the mammals affected would be seals (California sea lion and harbor seals) and dolphins. The numbers of marine mammals affected by oil spills would be few to none for operational spills (<1,000 bbl), and potentially up to 10 under worst-case scenarios at the Terminal (either the existing or the alternate site). The loss of an entire cargo of a carrier in transit could impact 10s of animals. This level of impact is comparable to the impact of the Santa Barbara blowout of 1969, where 10s of seals were oiled (although only one mortality was confirmed). In the model simulations, these animals are assumed to be uniformly distributed over the entire model domain. However, in reality they are concentrated in certain areas (e.g., near the Channel Islands) which might be removed from the oil. Avoidance (or attraction) behavior is not considered in the model, for lack of specific information on each species' likely behavior in the event of an oil spill.

C.9 Estimated Biological Impacts: Fish and Invertebrates

Biological impacts to fish and invertebrates were estimated using the fates and biological model results of the 3 individual runs for each stochastic scenario. The criteria for the 3 individual runs were:

1. the worst case run for impacts to critical resources to the California mainland shore;
2. the worst case run for impacts for impacts to critical resources to the islands along Santa Barbara Channel (San Miguel Island, Santa Rosa Island, Santa Cruz Island, and Anacapa Island); and
3. the worst case run for oiling to the water column.

The densities of fish and invertebrates were data compiled for the Los Angeles Coast (province 41) by French et al. (1996). These data were used in the modeling.

The following tables are the summary of the biological results for all of the individual worst case runs. The terminal scenarios with 1,000 bbl are for the same dates and times as the worst case run to the California mainland for the respective 11,000 bbl or 12,090 bbl diesel or crude scenarios. The 2,500 bbl scenarios are for the same dates and times as the three worst case runs for the 275,000 bbl scenarios of each oil type.

Table C.9-1. Terminal, 1,000 bbl diesel (ES-Pipe-1k-d): Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	3	6
Total large pelagic fish	0	0
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	1	2
Total	4	8

There were no fish or invertebrate injuries for the 1,000 bbl light crude or heavy crude spills at the terminal (ES-Pipe-1k-lc and ES-Pipe-1k-hc).

Table C.9-2. Terminal, diesel (ES-Pipe-11k-d), worst case run to California mainland: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	280	617
Total large pelagic fish	2,447	5,395
Total demersal fish	1	3
Total demersal invertebrates	2	4
Total mollusks	17	38
Total	2,747	6,057

Table C.9-3. Terminal, diesel (ES-Pipe-11k-d), worst case run to islands along Santa Barbara Channel: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	1	2
Total large pelagic fish	0	0
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	0	0
Total	1	3

Table C.9-4. Terminal, diesel (ES-Pipe-11k-d), worst case run to water column: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	18,211	40,149
Total large pelagic fish	57,106	125,898
Total demersal fish	8	18
Total demersal invertebrates	38	83
Total mollusks	12	26
Total	75,375	166,174

There were no fish or invertebrate injuries for the light crude or heavy crude spills at the terminal (ES-Pipe-12k-lc and ES-Pipe-12k-hc).

Table C.9-5. Transit, diesel (ES-Trans-d), worst case run to California mainland: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	451,597	995,601
Total large pelagic fish	966,276	2,130,275
Total demersal fish	10,606	23,383
Total demersal invertebrates	35,234	77,678
Total mollusks	8,349	18,407
Total	1,472,063	3,245,343

Table C.9-6. Transit, diesel (ES-Trans-d), worst case run to islands along Santa Barbara Channel: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	1,327,880	2,927,475
Total large pelagic fish	2,229,299	4,914,764
Total demersal fish	15,865	34,975
Total demersal invertebrates	273,028	601,923
Total mollusks	64,298	141,754
Total	3,910,370	8,620,891

Table C.9-7. Transit, diesel (ES-Trans-d), worst case run to water column: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	237,771	524,195
Total large pelagic fish	2,745,459	6,052,701
Total demersal fish	1,986	4,379
Total demersal invertebrates	2,138	4,713
Total mollusks	1,516	3,342
Total	2,988,870	6,589,330

Table C.9-8. Transit, light crude (ES-Trans-lc), worst case run to California mainland: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	6	13
Total large pelagic fish	0	0
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	2	4
Total	8	17

Table C.9-9. Transit, light crude (ES-Trans-lc), worst case run to islands along Santa Barbara Channel: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	6	13
Total large pelagic fish	0	0
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	1	3
Total	7	16

Table C.9-10. Transit, light crude (ES-Trans-lc), worst case run to water column: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	12	26
Total large pelagic fish	563	1,242
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	2	5
Total	578	1,274

Table C.9-11. Transit, heavy crude (ES-Trans-hc), worst case run to California mainland: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	297	655
Total large pelagic fish	43	95
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	2	4
Total	342	754

Table C.9-12. Transit, heavy crude (ES-Trans-hc), worst case run to islands along Santa Barbara Channel: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	4	8
Total large pelagic fish	0	0
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	1	2
Total	4	10

Table C.9-13. Transit, heavy crude (ES-Trans-hc), worst case run to water column: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	3	6
Total large pelagic fish	30	66
Total demersal fish	0	0
Total demersal invertebrates	0	0
Total mollusks	1	1
Total	33	73

There were no fish or invertebrate injuries for the worst case 2,500 bbl diesel transit spill to the California mainland (ES-Trans-2K-d).

Table C.9-14. Transit, 2,500 bbl diesel (ES-Trans-2K-d), worst case run to islands along Santa Barbara Channel: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	18	40
Total large pelagic fish	0	1
Total demersal fish	1	2
Total demersal invertebrates	0	1
Total mollusks	4	8
Total	24	52

Table C.9-15. Transit, 2,500 bbl diesel (ES-Trans-2K-d), worst case run to water column: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	1,059	2,335
Total large pelagic fish	33,974	74,899
Total demersal fish	2	5
Total demersal invertebrates	10	22
Total mollusks	15	34
Total	35,060	77,295

There were no fish or invertebrate injuries for the 2,500 bbl light crude or 2,500 bbl heavy crude transit spills (ES-Trans-2K-lc and ES-Trans-2K-hc).

Table C.9-16. Alternate Berth, diesel (ES-Alt-30K-d), worst case run to California mainland: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	1,755	3,870
Total large pelagic fish	19,712	43,458
Total demersal fish	14	31
Total demersal invertebrates	0	0
Total mollusks	6	13
Total	21,488	47,372

Table C.9-17. Alternate Berth, diesel (ES-Alt-30K-d), worst case run to islands along Santa Barbara Channel: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	14,409	31,767
Total large pelagic fish	63,408	139,791
Total demersal fish	19	43
Total demersal invertebrates	127	280
Total mollusks	90	198
Total	78,054	172,079

Table C.9-18. Alternate Berth, diesel (ES-Alt-30K-d), worst case run to water column: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	68,194	150,342
Total large pelagic fish	491,130	1,082,756
Total demersal fish	151	333
Total demersal invertebrates	1,593	3,512
Total mollusks	427	941
Total	561,495	1,237,884

There were no fish and invertebrate injuries in the worst case run to the California mainland and the islands along the Santa Barbara Channel for the light crude scenario at the Alternate Berth.

Table C.9-19. Alternate Berth, light crude (ES-Alt-30K-lc), worst case run to water column: Fish and invertebrate impact (as biomass lost in kg and lbs).

Species Group	Biomass (kg)	Biomass (lbs)
Total small pelagic fish	440	971
Total large pelagic fish	20,580	45,371
Total demersal fish	1	2
Total demersal invertebrates	2	5
Total mollusks	22	48
Total	21,045	46,397

There were no fish and invertebrate injuries in the worst case runs for the heavy crude scenario at the Alternate Berth.

Table C.9-20 summarizes the expected impacts for fish and invertebrates for the hypothetical worst-case scenarios for spills at the existing Terminal, at the alternate terminal site, and from tankers in transit to and from the Terminal. The results show that heavy crude spills of all volumes would not be expected to cause measurable impacts to fish and invertebrates in the water column and sediments. This is because heavy crude is highly viscous and, therefore, dispersion into the water column is minimal. Thus, subsurface biota would not be exposed to oil hydrocarbons. Light crude would only be dispersed into the water during storm events, and rarely would impacts to fish and invertebrates be significant. The 30,000-bbl spill of light crude in shallow water (at the alternative Terminal location) was the only crude oil spill modeled where impacts exceeded 1,000 kg under worst-case environmental conditions. Thus, impacts of crude oil spills (of all oil densities) on fish and invertebrates are expected to be negligible or minor for the existing Terminal location and for spills from tankers in transit.

Diesel fuel oil has a low viscosity and is easily dispersed into the water column by breaking waves (white caps and along the shoreline). Thus, if a large spill (11,000 bbl or more) of diesel were to occur at a time and location when waves were breaking (i.e., when winds exceed 12 knots, or in surf), impacts to fish and invertebrates could occur. Typically, impacts would be highest when winds are onshore and the diesel is concentrated in shallow water. However, a very large spill, such as a transit scenario with the loss of an entire cargo of diesel (clearly an unlikely event) under Santa Ana wind conditions (strong winds from the east that drive the diesel towards the Channel Islands), could result in the loss of several million kg of fish and invertebrates (e.g., the worst case Transit, diesel; 275,000 bbl spills). Note that the run date selected as the worst case to the water column was that with the maximum percent of oil entering the water after the spill, which may occur in areas of lower fish and invertebrate densities than for other spill runs where the percent in the water is lower. In addition, in cases where the diesel contamination enters kelp beds, in which there is a much higher density of fish and invertebrates, the impact would be greater than in those cases where oil does not enter kelp beds.

The impact of these worst case diesel spills would be considered minor in the long term (over years), as the biomass of fish and invertebrates in the Santa Monica Bay area is orders of magnitude larger than the magnitude of these impacts and marine species have the capacity to reproduce and repopulate depopulated areas quickly.

Table C.9-20. Estimated injuries (as biomass lost in kg) for fish and invertebrates in the three representative runs for the 15 scenarios.

Scenario	Worst case to CA mainland	Worst case to islands along Santa Barbara Channel	Worst case to water column
Terminal, diesel ; 1,000 bbl (ES-Pipe-1k-d)	4	-	-
Terminal, light crude; 1,000 bbl (ES-Pipe-1k-lc)	0	-	-
Terminal, heavy crude; 1,000 bbl (ES-Pipe-1k-hc)	0	-	-
Terminal, diesel; 11,000 bbl (ES-Pipe-11k-d)	2,747	1	75,375
Terminal, light crude; 12,090 bbl (ES-Pipe-12k-lc)	0	0	0
Terminal, heavy crude; 12,090 bbl (ES-Pipe-12k-hc)	0	0	0
Transit, diesel; 275,000 bbl (ES-trans-d)	1,472,063	3,910,370	2,988,870
Transit, light crude; 275,000 bbl (ES-trans-lc)	8	7	578
Transit, heavy crude; 275,000 bbl (ES-trans-hc)	342	4	33
Transit, diesel; 2,500 bbl (ES-trans-d-2K)	0	24	35,060
Transit, light crude; 2,500 bbl (ES-trans-lc-2K)	0	0	0
Transit, heavy crude; 2,500 bbl (ES-trans-hc-2K)	0	0	0
Alternate, diesel; 30,000 bbl (ES-alt-30k-d)	21,488	78,054	561,495
Alternate, light crude; 30,000 bbl (ES-alt-30k-lc)	0	0	21,045
Alternate, heavy crude; 30,000 bbl (ES-alt-30k-hc)	0	0	0

C.10 Estimated Impacts: Sensitive Sites

Potential impacts to identified sensitive sites were evaluated by overlaying the modeled surface oil trajectory on mapped sensitive resource sites. Lists of the critical sites that were evaluated for the modeling scenarios are in Tables C.10-1 and C.10-2. These tables also list the species of concern for each site. Figure C.10-1 shows the locations of these sensitive sites.

The determination of worst case scenarios was based on the run in each scenario that hit the most critical resource areas in Tables C.10-1 and C.10-2. For instance, the worst case run to the California mainland for the 11,000 bbl diesel scenario at the Terminal was run 38 (out of 100), which hit 8 of the sensitive sites listed in Table C.10-1.

Table C.10-1. Sensitive sites along the California mainland and the species of concern at each site.

Sensitive Site	Latitude	Longitude	Ground nesting bird species	Non-ground nesting bird species	Marine Mammals	Fish
Cojo Anchorage	34.445	-120.45			southern sea otter	
Damsite Canyon Creek	34.449	-120.427				
Canada del Cojo	34.454	-120.414				tidewater goby
Canada del Pascado	34.458	-120.356				tidewater goby
Canada de las Agujas	34.459	-120.347				tidewater goby
Arroyo El Bulito	34.462	-120.333				tidewater goby
Canada del Agua	34.467	-120.309				tidewater goby
Canada De Santa Anita	34.466	-120.306				tidewater goby
Canada De Alegria	34.468	-120.272				tidewater goby
Canada Del Agua Caliente	34.467	-120.253				tidewater goby
Gaviota Creek	34.47	-120.228				tidewater goby
Arroyo Hondo	34.473	-120.142				tidewater goby, steelhead
Arroyo Quemado	34.464	-120.101				tidewater goby
Refugio Creek	34.462	-120.07				tidewater goby
El Capitan Creek	34.457	-120.023				
Naples Creek	34.44	-119.965				
Eagle Creek	34.435	-119.929				tidewater goby
Tecolote Creek	34.431	-119.918				tidewater goby
Bell Canyon Creek	34.428	-119.913				tidewater goby
Devereaux Slough	34.409	-119.882	Western snowy plover, Belding's savannah sparrow			tidewater goby
Campus Lagoon	34.405	-119.846				
Goleta Slough	34.416	-119.826	Belding's savannah sparrow			tidewater goby
Arroyo Burro Creek	34.402	-119.743				tidewater goby
Leadbetter Beach	34.402	-119.699				
Santa Barbara Harbor	34.405	-119.692			California sea lion	
Mission Creek: Laguna Channel	34.413	-119.684				tidewater goby
Sycamore Creek	34.415	-119.676				tidewater goby
Andre Clark Bird Refuge Outlet	34.417	-119.662				tidewater goby

Sensitive Site	Latitude	Longitude	Ground nesting bird species	Non-ground nesting bird species	Marine Mammals	Fish
Elyse Creek	34.412	-119.577				
Arroyo Paredon Creek	34.413	-119.559				tidewater goby
Carpinteria Saltmarsh	34.397	-119.537	Belding's savannah sparrow, light-footed clapper rail			tidewater goby
Carpinteria Creek	34.39	-119.521				tidewater goby
Rincon Creek	34.373	-119.477				tidewater goby, steelhead
Ventura River	34.274	-119.308				tidewater goby, steelhead
Ventura Harbor	34.244	-119.272				
Santa Clara River Estuary	34.233	-119.268				tidewater goby, steelhead
McGrath Lake	34.21	-119.258				
Channel Island Harbor (CIH)	34.153	-119.229				
Port Hueneme	34.143	-119.214				
Ormond Beach Wetlands	34.135	-119.185				tidewater goby
Mugu Lagoon	34.098	-119.091	Belding's savannah sparrow, light-footed clapper rail, California least tern, western snowy plover			tidewater goby
Sycamore Canyon	34.07	-119.013				
Arroyo Sequit	34.044	-118.935				steelhead
Zuma Canyon	34.014	-118.822				
Malibu Lagoon	34.031	-118.681				tidewater goby, steelhead
Topanga Creek	34.04	-118.579				tidewater goby, steelhead
Ballona Creek	33.966	-118.455	Belding's savannah sparrow			
Ballona Lagoon Wetlands and Del Rey Lagoon	33.96	-118.458				
Dockweiler State Beach North (Venice Beach)	33.982	-118.474	California least tern			
Cabrillo Beach Wetlands (within	33.714	-118.285				

Sensitive Site	Latitude	Longitude	Ground nesting bird species	Non-ground nesting bird species	Marine Mammals	Fish
POLA)						
Pier 400, Los Angeles Harbor	33.716	-118.248	California least tern, elegant tern, royal tern, Caspian tern, black skimmer			
Navy Mole, Long Beach Harbor (w/I POLB)	33.744	-118.22		Great blue heron, black-crowned night heron, snowy egret		
Golden Shore Marine Reserve (within POLB) City of LB	33.761	-118.2				
Alamitos Bay - Los Cerritos Wetlands	33.735	-118.12	Belding's savannah sparrow			
Anaheim Bay (Seal Beach National Wildlife Refuge)	33.725	-118.102	California least tern, Belding's savannah sparrow, light-footed clapper rail, large-billed savannah sparrow, black skimmer, killdeer	great blue heron		
Bolsa Chica Ecological Reserve (from Anaheim Bay via Huntington Harbour)	33.702	-118.055	California least tern, Belding's savannah sparrow, western snowy plover, Forster's tern, elegant tern, Caspian tern, royal tern, black skimmer, large-billed savannah sparrow, black-necked stilt	great blue heron		
Bolsa Chica Wetland (south channel)	33.688	-118.042	Belding's savannah sparrow, black-necked stilt, western snowy plover, northern pintail, blue-winged teal, redhead, killdeer			
Talbert Marsh	33.629	-117.963	Belding's savannah sparrow			
Santa Ana River	33.627	-117.959	California least term, western snowy plover, killdeer			
Newport Slough Wetland (enters through Santa Ana River)	33.631	-117.957	Belding's savannah sparrow			
Newport Bay Mouth (leads to Lower and Upper Newport Bay)	33.587	-117.879	California least tern, light-footed clapper rail, Belding's savannah sparrow, black skimmer, American avocet, black-necked stilt, blue-winged teal, red-winged blackbird	western gull, osprey, black-crowned night heron, great blue heron	California sea lion	

Sensitive Site	Latitude	Longitude	Ground nesting bird species	Non-ground nesting bird species	Marine Mammals	Fish
Aliso Creek	33.51	-117.753				tidewater goby
San Juan Creek	33.461	-117.684	California least tern?	black-crowned night heron, snowy egret, great blue heron		tidewater goby, steelhead trout
Salt Creek	33.481	-117.725				
San Mateo Creek	33.385	-117.595	common moorhen, pied-billed grebe, red-winged blackbird (pers. Comm. Paquette)			tidewater goby, steelhead trout
San Onofre Creek	33.38	-117.579	red-winged blackbird			tidewater goby
Las Flores Creek	33.289	-117.467				tidewater goby
Hidden Lagoon	33.274	-117.453				tidewater goby
French Lagoon	33.262	-117.442				tidewater goby
Cockleburr Canyon	33.249	-117.433				tidewater goby
Santa Margarita River	33.228	-117.418	California least tern, western snowy plover, Belding's savannah sparrow			tidewater goby
San Luis Rey River	33.2	-117.395				
La Salina Lagoon (Buccaneer Park)	33.176	-117.371				
Buena Vista Lagoon	33.163	-117.361				
Agua Hedionda Lagoon	33.143	-117.346	Belding's savannah sparrow			
Batiquitos Lagoon	33.085	-117.316	Belding's savannah sparrow, California least tern, Forster's tern, black skimmer, western snowy plover			
Moonlight Creek	33.048	-117.301				
San Elijo Lagoon	33.015	-117.283	Belding's savannah sparrow, light-footed clapper rail, California least tern, western snowy plover, spotted sandpiper			
San Diegito Lagoon	32.975	-117.273	California least tern			
Los Penasquitos Lagoon (Torrey Pines State Reserve)	32.907	-117.257	Belding's savannah sparrow, light-footed clapper rail, Calif. least tern, w. snowy plover			
Soledad Lagoon	32.934	-117.263				
Mission Bay	32.757	-117.261	California least tern, Belding's savannah sparrow			
San Diego River	32.753	-117.256	Light-footed clapper rail			

Sensitive Site	Latitude	Longitude	Ground nesting bird species	Non-ground nesting bird species	Marine Mammals	Fish
San Diego Bay	32.675	-117.23	California least tern, Caspian tern, Forster's tern, elegant tern, royal tern, black skimmer, gull-billed tern, light-footed clapper rail, Belding's savannah sparrow, large-billed savannah sparrow, western snowy plover	black-crowned night heron		
Tijuana Slough	32.556	-117.132	California least tern, light-footed clapper rail, western snowy plover, Belding's savannah sparrow, large-billed savannah sparrow, northern harrier			

Table C.10-2. Sensitive sites on the islands along the Santa Barbara Channel and the species of concern at each site.

Sensitive Site	Latitude	Longitude	Ground nesting bird species	Non-ground nesting bird species	Marine Mammals	Fish
San Miguel Island	34.03	-120.45	western snowy plover	Ashy storm-petrel, Xantus' murrelet, pigeon guillemot, rhinoceros auklet, tufted puffin, Cassin's auklet	Northern fur seal, California sea lion, Northern elephant seal, southern sea otter	black abalone
San Miguel Island (Peterson Cove)	34.038	-120.441			Guadelupe fur seal	
Santa Rosa Island	33.981	-119.983	western snowy plover	pigeon guillemot		black abalone
Santa Cruz Island	34.047	-119.547		pigeon guillemot, ashy storm-petrel, double-crested cormorant, California brown pelican		
Anacapa Island	34.005	-119.418		Xantus' murrelet, western gull, California brown pelican, double-crested cormorant		black abalone

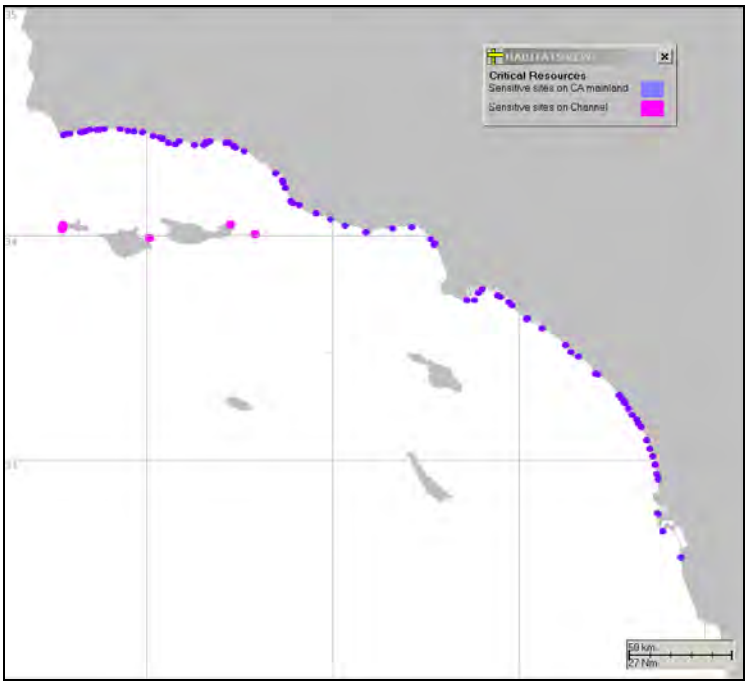

Figure C.10-1. Location of sensitive sites on California mainland and islands along Santa Barbara Channel.

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